

CLAIMS

1. Pipeline lining apparatus comprising a pipeline pig and an inner tube (50), the pipeline pig comprising longitudinal inner (7) and outer (6) walls and end walls (10, 12), said inner and outer walls being of substantially annular arrangement in transverse section, the pig being such that, in use, space enclosed by said walls is filled with fluid, and on applying a motive force to the pipeline pig, the pipeline pig advances along a pipeline by way of substantially radial portions of the walls following respective endless loops (10a, 12a, 41a, 42a), the apparatus being such that, in use the pipeline liner and the inner tube are located within a pipeline, the inner tube being spread out against an inner surface of the pipeline liner prior to insertion into the pipeline, and the pipeline pig is caused to pass through the pipeline liner and the inner tube so as to urge said pipeline liner and said inner tube radially outwards towards an inner surface of the pipeline.
2. Apparatus as claimed in claim 1, in which the pipeline is filled with gaseous matter.
3. Apparatus as claimed in claim 1 or claim 2, in which the pipeline is filled with liquid.
4. Apparatus as claimed in claim 1, claim 2 or claim 3 in which the pipeline pig is filled with fluid to a pressure in the range $0.3 \times 10^5 \text{ Pa}$ to $10 \times 10^5 \text{ Pa}$.
5. Apparatus as claimed in claim 3, in which the pipeline pig is filled with fluid to a pressure of approximately $1.5 \times 10^5 \text{ Pa}$.

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6. Apparatus as claimed in any preceding claim in which the pipeline pig is provided with a valved inlet which enables the pig to be filled with fluid.

7. Apparatus as claimed in any preceding claim in which the pipeline pig is formed from a flexible tubular membrane which is everted at each distal end, and the distal ends attached to each other.

8. Apparatus as claimed in claim 7, in which the pipeline pig is formed from a flexible elastic membrane.

9. A method of installing a pipeline liner in a pipeline comprising positioning the pipeline liner in the pipeline, positioning a pipeline pig towards one end of the pipeline liner and applying a motive force to the pipeline pig so as to cause the pipeline pig to advance through the pipeline liner, the pipeline pig comprising longitudinal inner (7) and outer (6) walls, and end walls (10, 12), said inner and outer walls being of substantially annular arrangement in transverse section, the pipeline pig being such that, in use, space enclosed by said walls is filled with fluid, and the pipeline pig advances along the pipeline by way of substantially radial portions of the walls following respective endless loops (10a, 12a, 41a, 42a), the method further comprising positioning a pipeline liner (52) and an inner tube (50) in the pipeline (17), the inner tube being spread out against an inner surface of the pipeline liner prior to insertion into the pipeline, and causing the pipeline pig to pass through the pipeline liner and the inner tube so as to urge said pipeline liner and said inner tube radially outwards towards an inner surface of the pipeline.

10. A method as claimed in claim 9 which comprises filling the pipeline pig with fluid until the pipeline pig is capable of exerting a required radially outward pressure towards an inner surface (40) of the pipeline (17) when the pipeline pig is inside the pipeline.

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11. A method as claimed in claim 9 which comprises applying a pressurising fluid to a rearward end of the pipeline pig (1) so as to cause the pipeline pig to advance through the pipeline (17).
12. A method as claimed in claims 9, claim 10 or claim 11 which comprises filling the pipeline pig with fluid until sufficiently filled so that when the pipeline pig is inside the pipe a seal is formed between a downstream space (20) adjacent to a forward end (12) of the pipeline pig and an upstream space (18) adjacent a rearward end (10) of the pipeline pig.
13. A method as claimed in claim 12 in which the seal is sufficient to prevent pressurising fluid in the downstream space (20) from passing to the upstream space (18).
14. A method as claimed in any of claims 9 to 13 which comprises locating a launch chamber (23) towards one end of the liner (16), the launch chamber comprising an inlet (26) for receiving the pressurising fluid.
15. A method as claimed in any of claims 9 to 14 which comprises locating a receiving chamber (28) towards and opposite end of the pipeline liner (16).
16. A method as claimed in claim 15 in which the receiving chamber (28) comprises a pressure relief outlet (30).
17. A method as claimed in any of claims 9 to 16 which comprises passing an elongate member (13) through a central passage (8) of the pipeline pig (1) which passage is defined by the inner wall (7), the elongate member being in frictional engagement with the inner wall.

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18. A method as claimed in claim 17 which comprises moving the elongate member in the central passage (8) so as to control movement of the pipeline pig as the pipeline pig advances through the pipeline (17).
19. A method as claimed in any of claims 9 to 18 which comprises feeding a conduit (21) through a central passage (8) of the pipeline pig (1) which passage is defined by the inner wall (7) of the pipeline pig, and supplying pressurising fluid through the conduit to a space adjacent a forward end (12) of the pipeline pig.
20. A method as claimed in any of claims 9 to 19 which comprises locating a conduit (22) between the outer wall (6) of the pipeline pig and an inner surface of the pipeline, and supplying pressurising fluid through the conduit to a space adjacent a forward end (12) of the pipeline pig.
21. A method as claimed in claim 9 in which a downstream end (55) of the inner tube (50) is adapted to receive and capture the pipeline pig.
22. A method as claimed in claim 21 in which the downstream end (55) is provided with a pressure relief outlet (57).
23. A method as claimed in any of claims 9 to 22 which comprises maintaining pressurising fluid in the pipeline for a predetermined time after the pipeline pig has passed through said pipeline.
24. A method as claimed in any of claims 9 to 23 in which pressurising fluid provides a pressure in the pipeline of between 0.2×10^5 to 2×10^5 Pa.
25. A method as claimed in any of claims 9 to 24 in which pressurising fluid provides a pressure in the pipeline of approximately 0.5×10^5 Pa.

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